

8. Kostya

Program Name: Kostya.java

Input File: kostya.dat

Kostya is folding and putting away his laundry. He has a laundry bin with his N pairs of socks. Kostya pulls out individual socks from his laundry bin one at a time. Each time he pulls a sock, he pulls out any of the remaining socks in the bin with equal probability. When Kostya pulls out the first sock in a pair, he places it on his bed. When he pulls out the second sock in a pair, he folds it with the first sock (which is already on his bed) and puts the pair in a dresser.

Kostya's bed is quite small, and can only hold K individual socks at a time. If there are already K socks on the bed and Kostya pulls out the first sock in a new pair, he runs out of bed space and gets frustrated. Compute the probability that Kostya gets frustrated.

Input: The first line of input contains an integer T ($1 \leq T \leq 50$), the number of test cases. The next T lines each have two integers N K ($1 \leq K \leq N \leq 100$).

Output: For each test case, output the probability that Kostya gets frustrated while folding his laundry. Format your answer with the case number as in the samples. Round your answer to 4 decimal places.

Sample Input:

```
2
2 1
4 4
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Sample Output:

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Case #1: 0.6667
Case #2: 0.0000
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Sample Explanation: In the first test case, Kostya has 2 pairs of socks and space for 1 sock on his bed. If the first two socks Kostya pulls out are from different pairs, he gets frustrated. The probability this happens is $2/3$.

In the second test case, Kostya always has enough space on his bed for all his socks, so he can never be frustrated.